NOTES ON EXORISTIDÆ (TACHINIDÆ AUCTT.) AND ALLIES.

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The writer has observed with much satisfaction the advent of several new North American workers in this field within the past five years, and trusts not only that their number will be trebled or quadrupled within the next five years, but that all of these new students will publish conscientious descriptions of as many new forms as it may be possible for them to find among these flies. Notwithstanding the numerous forms already described, there is a host of genera and species still awaiting characterization. If the student is so fortunate as to be a competent artist himself, he should present drawings of the new forms characterized. Mr. W. R. Walton's work in this respect is much to be commended. His plates are models of accuracy and constitute the first thoroughly competent drawings of Muscoidea to appear for almost a quarter of a century—since the eleven quarto plates by Brauer & von Bergenstamm published in 1889, with which they compare very favorably (except that the proboscis and palpi should always be drawn with the head if they are sufficiently exserted in the original). Students of Muscoidea who can produce drawings of this class are much to be desired, for it must be recognized that no drawings in this superfamily can approach accuracy unless made by a specialist in the group. The drawings made by Dr. Williston five years ago for the third edition of his "Manual" are excellent and deserve much credit, but they are unfortunately too much reduced and in consequence do not always show details accurately. Enlarged photographs properly made will be found extremely serviceable, but so far competent drawings are found to show details far better. It may be possible in the future to develop insect photography sufficiently to show all external muscoid characters clearly, but until that day arrives drawings must take first place.

Aside from drawings, descriptions need to be carefully made, not omitting from generic or specific diagnoses mention of any characters that may help to place the form in hand. Cases to be noted are omission of ocellar bristles present or absent, comparative length of an-

tennal joints in the sexes, scutellar bristles, larvipositor sharply pointed at tip or not, from description of *Eutrixoides* Walton (Ent. News, Vol. XXIV, pp. 50–51); measurement of *Chætophleps crassinervis* Walton (*l. c.*, pp. 51–52); and color and form of palpi from description of *Cryptomeigenia aurifacies* Walton (Proc. E. S. Wash., Vol. XIV, p. 199). Mr. Walton points out that the best view of the thoracic vittæ may be obtained from the rear at an angle of about 45°, but he overlooks the fact that there are often present an extra pair of median vittæ or an unpaired median vitta behind suture only visible from in front.

Mr. Walton states in the last cited article that *Cryptomeigenia theutis* and *Eutrixa exile* are the only species up to that time recorded as parasitic on adults of *Lachnosterna*. He overlooks the record of *Viviania lachnosternæ* (Towns., Tax. Musc. Flies, p. 106). It would seem more probable that this species came from an adult carabid inadvertently introduced into the cage with the Lachnosternas, but the possibility of the Lachnosterna record being correct must not be lost sight of.

Another point to be mentioned in connection with *Cryptomeigenia* is that two distinct forms appear to be confused under this generic name. *C. aurifacies* Walton appears to be *Emphanopteryx* Towns. on the character of the acutely pointed and exserted ovipositor. In Ann. E. S. Am., Vol. IV, pp. 140 and 329, the piercer-like organ of *Emphanopteryx* female is mentioned. The writer's only reason for claiming the absence of this organ in the female of *Cryptomeigenia* is based on a dissection and mount carefully made by Mr. W. R. Thompson at the Gipsy Moth Laboratory, June 11 to 16, 1909. A female of *C. theutis*, determined by Coquillett, was relaxed, abdomen soaked up and "found to contain a coiled uterus with flattened Tachina-like eggs showing maggots with mouth-hooks" (Thompson). The hypopygium of this specimen was removed, cleared and mounted in balsam on two slides, with resulting record of "no piercer such as is present in *Emphanopteryx cumyothyroides* T. is visible" (Thompson). This specimen is TD1828. Female of *Emph. cumyothyroides* (det. Towns.) was present for comparison and possessed the same acute exserted ovipositor figured by Walton for his *C. aurifacies*.

It may be noted here that *Emphanopteryx* doubtless deposits incubated eggs containing the more or less fully formed maggot, and prob-

ably these are deposited inside the adult scarabæid host. *Eutrixoides* quite certainly deposits maggots, probably inserting them inside the host. *Cryptomeigenia* and *Emphanopteryx* belong to the subtribe Meigeniina of the family Exoristidæ. *Eutrixoides* quite certainly belongs to the family Megaprosopidæ, and so does *Eutrixa* in all probability. The last may need to be dissected to make sure of this. The Megaprosopidæ deposit elongate maggots developed in utero from elongate subcylindrical thin-chorion eggs, while the Meigeniina deposit thick-chorion flat-oval eggs incubated in utero. The two groups are thus very distinctly removed from each other, though the general habitus of the flies outside of the head characters may be similar.

Mr. Walton's *Chætophleps crassinervis* may quite possibly be a female *Lixophaga* Towns. There are no characters in the description of the two forms to hinder this conclusion. Such differences as are apparent may easily be sexual. *Chætophleps* female possesses piercer, ventral carina and spinulæ.

Mr. W. R. Thompson has done some most excellent work on these flies, and it is to be hoped that he will continue his publication of both taxonomic and biologic results. His correction of the writer's sex-determination of *Acronarista* is accepted herewith (Can. Ent., Vol. XLIII, p. 313).

Mr. John D. Tothill has begun a series of papers on these groups in Can. Ent., Vol. XLIV, pp. 1–5. His descriptions are well drawn, but his adoption of Coquillett's synonymy under *Tachinophyto* has led him into error. *Lixophaga* is certainly a distinct genus from *Tachinophyto,* and *Methypostena* is also certainly distinct. If the characters of discal abdominal macrochætæ, scutellar bristles, ciliate facialia, cheek width, parafacial width, length of second antennal joint, etc., are all found to be variable within the same sex, then *Pseudomyothyria* may be the same as *Tachinophyto.* That such variability can occur is practically impossible. The following table will show the distinctions:

1. No discal abdominal macrochætæ in either sex.....2.
   Discal abdominal macrochætæ present in both sexes.....3.
2. No orbital bristles in male (parasitic on Rhynchophora).....Lixophaga.
   Orbital bristles in both sexes, facialia not ciliate more than about one third way up, parafacials moderately wide, cheeks about one fourth eye-height, scutellum with strong decussate apical pair of bristles reaching base of third abdominal segment and two shorter lateral pairs,

second antennal joint elongate, arista thickened on basal one fourth, strong costal spine, etc. (Parasitic on tineid larvæ.)..TACHINOPHYTO.

3. Apical cell ending in exact wingtip, no bristles on third vein, wings elongate and narrow, facialia not ciliate half way up, first vein ends opposite small cross-vein. (Parasitic on Chrysomelidæ.).....METHYPOSTENA.

Apical cell ending distinctly before wingtip, third vein bristly at base, wings short, facialia ciliate nearly to base of third antennal joint, parafacials narrow, cheeks about one sixth eye-height, scutellum with short apical pair of bristles and three strong lateral pairs, second antennal joint hardly elongate, arista thickened on basal one half, costal spine weak, first vein ends well beyond small cross-vein, orbital bristles present in both sexes. (Parasitic in lepidopterous and tenthredinid larvæ.) .....PSEUDOMYOTHYRIA.

Lixophaga and *Methypostena* are parasitic in the larvæ of the host, normally issuing therefrom but exceptionally wintering over therein and issuing from the adult beetle. *Methypostena* may also be parasitic on Coccinellidæ. The European *Erynnia* has the same host habit as *Methypostena.*

Mr. Tothill's study and comparison of *Senotainia* with *Trixoclista* indicates the distinctness of latter genus from *Amobia* on the character of the presence of a piercer in the female. *Trixoclista* probably deposits maggots.

One more paper remains to be noted here—that by Mr. Harrison E. Smith in Proc. E. S. Wash., Vol. XIV, pp. 118–127. His key of North American species of *Hyperecteina* is useful, but the species are not congeneric. The form *demylus* Wlk. is evidently a compsilurine fly, and *hylotomæ* Coq. is probably a member of the same group; *setigera* is probably a genus novum; *pergandei* is *Admontia,* and so probably is *degeerioides; limata* is *Neadmontia,* and *polita* is perhaps referable there; *retiniæ* may be an *Actia;* while *nasoni, unispinosa* and *tarsalis* are doubtful. On pp. 164–165 of the same volume, the writer referred to some of these points.

Regarding *Hyperecteina* and *Admontia,* the type of the former genus is *metopina* Sch. and that of the latter is *amica* Meig., as stated by Mr. Smith, but these two species are not as yet known to be congeneric. Until such time as this supposition is proved, it is preferable to retain the genera of which they are the types and thus avoid a possible multiplication of nomenclatural changes.

Mr. Smith's *Phorocera cinaris* female from Tampico, Mexico, is probably not conspecific with his New England specimens.

Practically all of the work reviewed above is **constructive**, and as such it is to be commended and emulated. The descriptions show careful preparation and that attention to details which is so essential to taxonomic treatment of these flies. Contrasted with this work is that performed by the late Mr. Coquillett, which was **destructive** to the extent that it attempted to sink into the synonymy valid generic and specific names. The synonymy indicated in his "Revision" and "Type Species" very largely remains to be verified, while it is safe to say that a very considerable part of it is absolutely unjustifiable. Furthermore, whenever it was possible so to manipulate type designations as to sink genera, he has not neglected the opportunity. Such work is a pulling down which leaves us worse off than before.

What is needed in the Muscoidea, and especially in the Exoristidæ and more nearly allied families, is an intensive study of the numerous forms thoroughly and conscientiously carried through, without bias and with that keen judgment of character values and natural appreciation of phylogenetic relations which stamp the master zoölogist. Each one of us must strive as best he can to attain this result.

NOTES ON THE FEEDING AND REARING OF THE MIDGE, CHIRONOMUS CAYUGÆ JOHANNSEN.

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During a brief opportunity for study in the Limnological Research Laboratory at Cornell University, at the suggestion of Professor James G. Needham, I undertook the problem of feeding bloodworms on a known food. Pure cultures were obtained and placed in sterilized media and kept under constant control. The larvæ, hatched from eggs, grew rapidly, pupated, and emerged in adult form in a little over a month's time. The details of the experiments are noted in the following paragraphs.

On April 28 a mass of eggs was collected with algæ in a pond at the field station near Cayuga Lake, Ithaca, New York. It was a rounded, pear-shaped mass of gelatine 2.5 by 6 millimeters in size,